

CLAIMS

What is claimed is:

1. A method for channel bonding a plurality of communications channels comprising:
 - receiving a master alignment marker;
 - receiving a slave alignment marker;
 - developing a model of skew in a slave channel based on the master alignment marker and the slave alignment marker; and
 - at a time determined by the slave channel, aligning the slave channel based on the developed model of skew.
2. The method of claim 1 wherein the master alignment marker is a first master alignment marker and the slave alignment marker is a first slave alignment marker, further comprising:
 - receiving a second master alignment marker;
 - receiving a second slave alignment marker; and
 - developing the model of skew based on the first and second master alignment markers and the first and second slave alignment markers.
3. The method of claim 1 further comprising assuming the master alignment marker leads the slave alignment marker.
4. The method of claim 1 further comprising assuming the master alignment marker lags the slave alignment marker.
5. The method of claim 1 wherein the model of skew indicates a skew value and a stable count.
6. The method of claim 1 wherein aligning the slave channel comprises adjusting a pointer in an elastic buffer of the slave channel.

7. The method of claim 6 wherein the pointer is a read pointer in the elastic buffer of the slave channel.
8. The method of claim 6 wherein adjusting the pointer in the elastic buffer of the slave channel comprises moving the pointer a number of bytes equal to a skew value of the model of skew.
9. The method of claim 6 further comprising:
 - if channel alignment is lost, canceling the adjustment to the pointer in the elastic buffer of the slave channel.
10. The method of claim 6 wherein the model of skew is not affected by the adjustment to the pointer.
11. The method of claim 1 wherein a skew value of the model of skew is greater than one-half of a minimum distance between consecutive alignment markers.
12. The method of claim 1 further comprising:
 - dividing a data word to be transmitted into a plurality of bytes; and
 - transmitting each byte of the plurality of bytes in a separate communications channel of the plurality of communications channels.
13. A method for developing a model of skew in a channel bonded communications channel comprising:
 - waiting for a leading alignment marker;
 - waiting for a lagging alignment marker; and
 - measuring a skew value between the leading alignment marker and the lagging alignment marker.
14. The method of claim 13 wherein the step of measuring the skew value comprises counting a number of clock cycles

between the leading alignment marker and the lagging alignment marker.

15. The method of claim 13 wherein the leading alignment marker is from a master channel and the lagging alignment marker is from a slave channel.

16. The method of claim 13 wherein the leading alignment marker is from a slave channel and the lagging alignment marker is from a master channel.

17. The method of claim 13 wherein the leading alignment marker is a first leading alignment marker, the lagging alignment marker is a first lagging alignment marker, and the skew value is a first skew value, further comprising:
 storing the first skew value;
 waiting for a second leading alignment marker;
 waiting for a second lagging alignment marker;
 measuring a second skew value the second leading marker and the second lagging marker; and
 comparing the second skew with the stored first skew value.

18. The method of claim 17 further comprising:
 if the stored first skew value equals the second skew value, incrementing a stable count value; and
 if the stored first skew value does not equal the second skew value, storing the second skew value and resetting the stable count value.

19. The method of claim 13 further comprising:
 waiting for a minimum period before waiting for the lagging alignment marker.

20. A communications system comprising:
 a master channel having a master buffer;

a slave channel having a slave buffer; and
control logic for developing a model of a skew
between the master channel and the slave channel.

21. The communications system of claim 20 further
comprising:

adjustment logic for adjusting a pointer in an
elastic buffer of the slave channel based on the developed
model of skew, wherein the adjustment logic adjusts the
pointer in the elastic buffer of the slave channel at a time
determined by the slave channel.

22. The communications system of claim 20 wherein the
control logic comprises a finite state machine.

23. The communications system of claim 20 wherein the
control logic comprises a microprocessor.

24. The communications system of claim 20 wherein the
control logic comprises:

a plurality of skew model blocks for developing a
plurality of models of the skew between the master channel
and the slave channel;

an arbiter for choosing one of the plurality of
skew model blocks.

25. The communications system of claim 24 wherein the
arbiter chooses a skew model block predicting the smallest
skew.

26. The communications system of claim 24 wherein the
arbiter chooses a skew model block having a non-zero stable
count.

27. The communications system of claim 24 wherein after all but one skew model block has failed, the arbiter chooses the one skew model block that has not failed.

28. The communications system of claim 24 wherein the arbiter chooses a skew model block based on known characteristics of the communications system.

29. The communications system of claim 20 wherein the control logic comprises:

a first skew model block for developing a first model of the skew between the master channel and the slave channel;

a second skew model block for developing a second model of the skew between the master channel and the slave channel; and

an arbiter for choosing one of the first and second skew model blocks.

30. The communications system of claim 29 wherein the first skew model block develops the first model of the skew between the master channel and the slave channel based on an assumption that the master channel leads the slave channel.

31. The communications system of claim 30 wherein the second skew model block develops the second model of the skew between the master channel and the slave channel based on an assumption that the master channel lags the slave channel.

32. The communications system of claim 20 wherein the slave channel comprises a plurality of slave channels, each having a slave buffer, and wherein each slave channel comprises control logic for developing a model of a skew between the master channel and the slave channel.